

A Statistical Analysis of Determining the Relationship between Academic and Internship Performance in IT interns

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Abstract—As internships continue to play a more crucial role in undergraduate degree programs, acting as a link between academic learning and professional work settings, it becomes vital to comprehend the connection between academic performance and internship outcomes. This study aims to underscore the effectiveness of data analytics in uncovering valuable insights that can illuminate the link between academic performance and internship success. A survey was distributed among 182 final-year students at Universiti Kuala Lumpur, a Malaysian university, all of whom had successfully completed their internships. This survey aimed to collect academic grades, feedback, and reflections from these students about their internship encounters. Pearson's and Linear Regression Correlation analysis was employed to explore and predict the potential influence of academic performance on internship achievements. The evaluation of performance encompassed three key areas: practical skills, ethics and professionalism, and problem-solving capabilities. The results revealed a slight positive correlation between academic and internship grades in the practical skills and problem-solving domains, while a weak negative correlation was identified concerning ethics and professionalism. As a result, the researchers concluded that there are additional factors at play that impact a student's internship performance. It is not entirely accurate to assert that a student's strong academic performance guarantees success during internships.

Keywords— *correlation analysis; linear regression academic performance; internship performance.*

I. INTRODUCTION

The ever-changing job market poses challenges for young individuals transitioning from education to the workforce [1].

Simply investing more time in schooling does not guarantee that individuals will possess the requisite practical, problem-solving, ethics, and professionalism skills needed to meet the intricate demands of the job market [2]. This concern raises alarms about the effectiveness of higher education in imparting practical job skills, leading to avoidable costs for economies, enterprises, and employees [3].

Higher educational institutions are expected to ready students with pertinent job skills before they enter the labor market [4]. They should acquaint students with the realities of the professional world, equipping them for forthcoming job roles and evolving job trends [5]. Such readiness not only enriches students' expertise in their respective domains but also nurtures fundamental workplace proficiencies like communication and problem-solving.

Diverse structured methods, including internships, dual-study programs, and project-based learning, offer opportunities to gain work experience [1]. Internships, specifically, have gained global popularity among universities, employers, and employees [6]. They grant university students the chance to attain hands-on experience and apply their theoretical knowledge in actual work settings [7]. Employers acknowledge the value of work experience during the hiring process, while universities increasingly incorporate internships to bridge the gap between classroom theories and real-world business practices [8].

In Malaysia, while the significance of internships is growing, there exists a dearth of empirical research addressing this matter within the Malaysian context. Consequently, this study aims to

explore whether the academic coursework provided by universities effectively readies students for their internship experiences. The research inquiries guiding this study are: (1) The Student's academic performance in ethics and professionalism category has a positive effect on the internship evaluation of ethics and professionalism. (2) The Student's academic performance in practical skills category has a positive effect on the internship evaluation of practical skills (3)The Student's academic performance in problem solving category has a positive effect on the internship evaluation of problem solving.

II. LITERATURE AND STUDIES

The interplay between academic achievement and performance during internships and employment has garnered significant attention within education and human resource management realms. This review of existing literature aims to comprehensively delve into the connection between academic success and internship or job performance, encompassing diverse viewpoints from prior research.

Lazear's (1977) argument advocates the existence of a positive correlation between academic accomplishments and job performance [9]. However, it underscores that academic achievements in isolation cannot ensure exceptional workplace performance. Similarly, Syama and Sulphrey (2012) challenge the prevalent reliance on academic performance as the sole indicator of job performance, underscoring its limitations. Their findings emphasize the necessity to factor in supplementary elements in recruitment determinations [10]. Nafukho and Hinton's (2003) study exposes that postgraduate education minimally enhances managerial performance [11].

Conversely, Feldman and Daniel (2009) propose that heightened educational levels favorably impact core task performance, ingenuity, and citizenship behaviors [12]. Chen et al. (2011) stress the significance of hands-on skills in meeting the evolving requirements of the contemporary workforce. These stances signify that exclusive dependence on academic performance might not suffice to assess an individual's potential for excelling in their occupation [13]. Chan (2010) contends that education amplifies workers' efficiency and lifetime earnings. Nevertheless, the rise of technology and potential deskilling scenarios challenge the association between education and job performance, potentially leading to detrimental or unfavorable earnings effects [14]. Jorgensen (2004) champions the separation of education and work, accentuating education's broader role in fostering active civic engagement, facilitating social roles, and enabling personal growth [15].

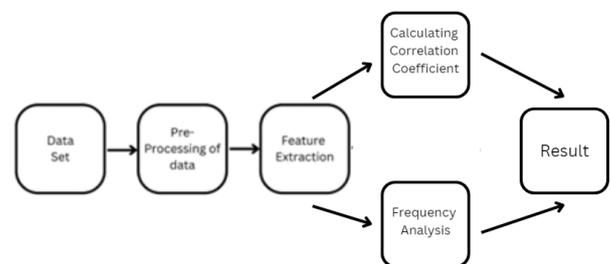
To sum up, the literature review indicates that while academic accomplishments hold relevance, they may not directly translate into job or internship proficiency. Other determinants, like hands-on skills and firsthand experience, significantly shape an individual's triumph in professional settings. Integrating internships into educational curricula has emerged as a valuable tactic for bridging the gap between theoretical learning and practical application, ultimately boosting student's employability.

III. METHODOLOGY

In this study, we employed the Pearson's correlation coefficient and as well as linear regression correlation coefficient to investigate and forecast whether the educational courses offered by the university have an impact on the students' performance during internships. The correlation coefficient serves as a measurement of the linear relationship between variables, like academic achievement and internship success [17]. This statistic gauges both the strength and direction of this connection, revealing whether it is positive or negative. Through the calculation of the correlation coefficient, we gauged the degree to which academic performance and internship accomplishments are interconnected. This numerical measure offers valuable insights into the interrelation of these factors and aids in assessing how well academic performance can predict success during internships.

Furthermore, we conducted a frequency analysis to glean perspectives from students regarding their internship experiences. In simpler terms, we explored whether strong academic performance corresponds to commendable internship outcomes and vice versa. Additionally, we sought to understand the collective viewpoint of students concerning their overall internship placements.

Figure 1: Overall Methodology used



A. Data Set

The researcher designed a survey to inquire about the student's academic grades and their level of contentment with their internship encounters. Table 1 presents the characteristics of the student responses documented in the questionnaire.

TABLE I. ATTRIBUTES

Attributes	Possible values
Gender	Male, Female.
Age Group	18-21, 22-25, 26-30, Above 30.
State	Labuan, Johor, Sarawak, Perlis, Pulau Pinang, Melaka, Negeri sembilan, Kedah, Terengganu, Kelantan, Perak, Pahang, Kuala Lumpur, Selangor, Sabah.
Do you believe that your academic performance has a direct effect on your internship/job performance?	Yes, No.
Does the coursework at the university prepares you for internship and employment?	Strongly Disagree, Disagree, Agree, Strongly Agree.
CGPA	2.0 - 2.5, 2.5 - 3.0, 3.0 - 3.5, 3.5 - 4.0.
Major	BCA, BSE, BNS, BIMD, BCSS, BCM, BCE.
How you felt about the overall internship experience?	Very satisfied, Satisfied, Neutral, Unsatisfied, Very Unsatisfied.

B. Data Pre-processing

1) Data Cleaning

A thorough process of data cleansing was carried out for the entire pool of 182 participants, meticulously identifying and eliminating any instances of duplicate or superfluous entries.

2) Data Validation

The questionnaire elicited information from the students regarding their academic performance, following which the university administration was engaged to authenticate the data of the exact 182 students who had submitted the forms.

3) Data Conversion

Initially, the grades were logged in alphabetical format (ranging from A to A-), yet to compute a correlation coefficient, these alphabetical grades were transformed into numerical equivalents using random number algorithms within R Studio.

C. Feature Extraction and Calculating correlation coefficient

This study commences by utilizing correlation coefficients (Pearson’s and Linear regression) to explore the potential impact of academic performance on internship outcomes. The university's academic courses are divided into four distinct categories: University Requirement Courses, Discipline Core Courses, Common Core Courses, and National Requirement Courses. In contrast, student internship performance is evaluated based on three variables: CLO2 (Problem Solving), CLO3 (Practical Skills), and CLO4 (Ethics and Professionalism).

To assess the influence of academic performance on internship success, the four academic course categories are streamlined into three by selectively extracting key courses. This reclassification involves designating Discipline Core Courses as Practical Skills courses, considering Common Core Courses as Problem Solving, and categorizing University and National Requirements as Ethics and Professionalism courses, as depicted in Figure 2.

Within the IT institute of the university, seven distinct programs are offered, each with its unique focus and course prerequisites. For instance, let's examine the "Bachelors of Computer Engineering Technology (Networking System) with Honors," encompassing 140 credit hours. Similar to this program, others also comprise a mix of courses from Discipline Core, University Requirements, Electives, and Foreign Languages. In each program, a subset of courses is chosen from each category, and their corresponding grades are compiled. Through calculating the average grades for each category across all seven programs, the researcher seeks to gain insights into the overall academic performance of students in these specific courses, as illustrated in Figure 3. This methodology aids in monitoring and assessing the curriculum's effectiveness across various categories for all programs, facilitating continuous enhancements and ensuring a comprehensive educational experience for students. Subsequently, the correlation coefficient is computed between the categorized academic courses and the internship evaluation criteria.

Figure 2: Course Categorization

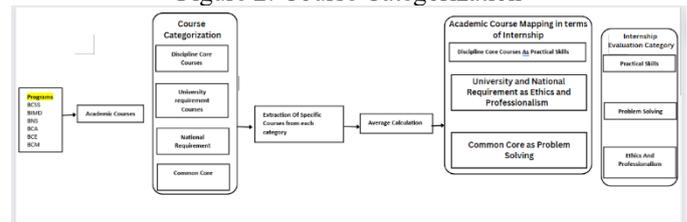
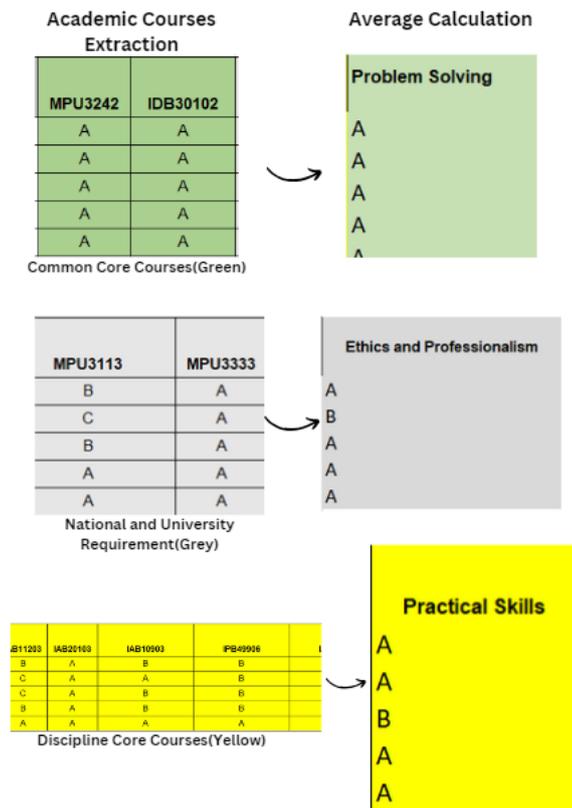


Figure 3: Courses Extraction and Average Calculation



The correlation coefficient is computed for the respective categories of both academic courses and internships, employing both Excel and R Studio. This approach serves to validate the outcomes and ascertain whether there exists a discernible influence of academic achievement on internship performance.

D. Frequency Analysis from students asking about their Overall Internship Experience

Students were surveyed about their comprehensive internship experiences via a questionnaire, and subsequently, the gathered responses were organized and stored within Excel spreadsheets. Following this, a frequency analysis was conducted on these responses utilizing Excel, as illustrated in Figure 4.

IV. RESULTS AND DISCUSSIONS

- Based on the outcomes of the correlation coefficient analysis, the results were as follows: The correlation coefficient between internship and academic data in the ethics and professionalism category yielded a value of -0.111 (approximately -0.1) for both Pearson's and linear regression correlation coefficient. This signifies a weak negative correlation, suggesting a slight inclination for the two variables to move in opposite directions. However, the relationship lacks significant strength or consistency. The resulting correlation coefficient

between internship and academic data within the practical skills category was determined to be 0.15569328 (approximately 0.2). This indicates a weak positive correlation, implying a subtle tendency for the two variables to align in a similar manner, though the connection is not robust.

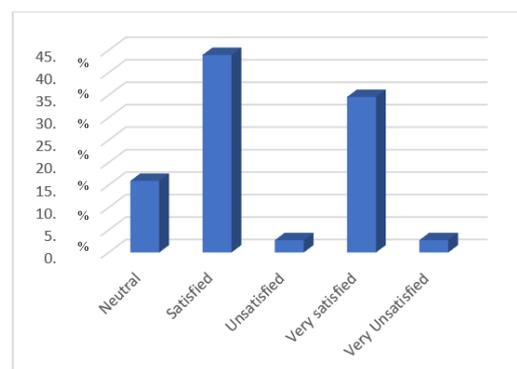
Similarly, the correlation coefficient between internship and academic data for both techniques within the problem-solving category was computed at 0.156626 (approximately 0.2), showcasing another instance of a weak positive correlation as shown in Table II.

Table II: Result calculation

Category	ρ - value calculated	ρ - value calculated	R value calculated	R value calculated	Result
	by Excel	by R	by Excel	by R	
Ethics and Professionalism	-0.111 ~ -0.1	-0.1110030 ~ 0.1	-0.12118 ~ -0.1	-0.10118 ~ -0.1	Weak negative correlation
Practical Skills	0.156626 ~ 0.2	0.156626 ~ 0.2	0.061644 ~ 0.1	0.1558 ~ 0.2	Weak positive correlation
Problem Solving	0.156693 ~ 0.2	0.15666932 ~ 0.2	0.187883 ~ 0.2	0.1567 ~ 0.2	Weak positive correlation

- As gleaned from the feedback provided by the interns: The analysis of the data offers insightful perspectives into the intern's sentiments regarding their internships. The visual representation depicted in Figure 4 underscores that most respondents expressed contentment. Specifically, 33 interns (43.96%) conveyed satisfaction, and an additional 63 (34.62%) indicated a high level of satisfaction. This optimistic sentiment emphasizes that a significant proportion of students enjoyed a gratifying and enriching internship experience. Conversely, a smaller fraction of respondents expressed neutral sentiments, accounting for 29 interns (15.93%) of the total responses. In contrast, 5 interns (2.75%) reported feelings of dissatisfaction or strong dissatisfaction. These findings suggest that the overall prevailing sentiment among students toward their internships is largely positive.

Figure 4: Internship Experience Assessment



Drawing from the perspectives of the students, it can be deduced that a substantial portion of university graduates exhibit considerable contentment with the internship opportunities orchestrated by the university and their holistic internship encounter. This favorable sentiment underscores the proficiency of the university's internship initiative in aligning with student anticipations, thereby enhancing their skill set, practical knowledge assimilation, and readiness for professional endeavors. On the whole, the affirmative responses underscore the noteworthy impact and efficacy of the internship program in furnishing a gratifying and enriching journey for the majority of graduates.

V. CONCLUSION

The outcomes of the study substantiate prior investigations that suggest a feeble association between academic accomplishments and internship or job effectiveness. The findings underscore the compelling notion that banking solely on academic achievement to forecast an individual's triumph in a professional role is unwarranted. The prevalent tendency to heavily hinge on academic performance as the pivotal indicator of a student's readiness for the job market is a practice that lacks accuracy, often observed among both students and universities. In lieu of this, universities and students should explore alternative credible factors that extend beyond academic attainment.

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